

RURAL SOLID WASTE TRANSFER
"THE FLAGSTAFF EXPERIENCE"

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INTRODUCTION

At previous Canadian Conferences on Waste Management, there have been several presentations made on transfer of solid waste in rural Alberta. The presentation this year brings you up-to-date on our experiences.

There are 115 solid waste transfer stations now operating within regional waste management systems in Alberta. These Regional Waste Management Systems were made possible because of the Waste Management Assistance Program administered by Alberta Environment. This program provides capital funding and technical assistance for the development of such systems. There are about 12 more that are operated by single municipalities, National Parks, or by private contractors.

The five types of transfer stations now being used in the rural areas include the following:

- 1) front end loader drop box
- 2) roll-off drop box
- 3) stationary compactor with drop box
- 4) inverting bins or transtor
- 5) push pit

The experiences in operating these various systems have shown us that the operational problems are very similar even though the equipment is very different. The types of waste and "people" problems that make operations difficult are the same for one system as they are for another. The solutions to these similar problems are also similar. (Table 3 of the Appendix shows the typical problems and solutions to these problems.)

To explain the problems and solutions in detail, we can look at the case history of any one of the 15 regional systems in Alberta with transfer stations. The most dramatic changes and developments have occurred in the Flagstaff Regional Waste Management system. Following is an account of their experiences.

FLAGSTAFF REGIONAL WASTE MANAGEMENT AUTHORITY

The County of Flagstaff is located south and east of the City of Edmonton approximately 165 km, or about two hours travel time by car. The County encompasses an area of 1,500 sections of land or 3900 km². It is about 65 km from east to west and 58 km north to south. There are 10 urban centres with about 5,100 residents. There are approximately 4,600 rural residents living in the county.

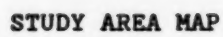
The area's economic base is agriculture and is supplemented by the oil and gas industry. The economic condition of both these industries has required the municipalities to become more efficient in their operations. This has had a major impact on Waste Management, as the municipalities are continuously looking for ways to minimize costs and provide a high level of service.

The Flagstaff Regional Waste Management Authority was organized in 1980 to resolve what was a critical problem for the area - waste disposal. The

FIGURE 1

GENERAL LOCATION MAP





Authority worked towards development of a system of waste transfer to a centrally located Regional Sanitary Landfill. A grant was provided through the Waste Management Assistance Program. The Authority began operation in 1981 and provided service to nine of the urban centers and the rural area. Originally, two villages in the neighbouring County of Camrose were also involved.

The transfer system originally consisted of 12 drop box transfer stations. The stations consist of either one or two 30 cubic meter containers placed against a retaining wall at the end of an earthen ramp. The transfer stations were fenced for litter control, but were not supervised.

The containers were picked up and dropped off with two tilt frame trucks. Servicing of each container meant one trip to the landfill for each 30 m³ of garbage.

The system was unique in the sense that it was the only system of its type that we know of where the community collection vehicles dumped into drop box containers. This practice, however, was short lived as there were great difficulties in scheduling container pick-ups to coincide with collection days in the towns and villages. There was frequent overfilling of the containers and an excessive number of container pick-ups required on collection days.

The Flagstaff Authority became the first, and to date, the only regional system in Alberta to operate a regional residential and commercial collection system in the municipalities. The collection system uses a 20 m³ rear loader compactor truck to service all the urban centers, except one. Over one hundred 2 m³ containers, which are serviced by the rear loader are placed at business establishments throughout the area.

Because the rear loader direct hauls to the landfill, this collection system eases the loading in the transfer stations, but it is not the end-all answer to the problems.

Following is an account of the types of problems encountered in the operation of the Flagstaff transfer system;

- 1) overfilling of containers;
- 2) heavy bulky wastes which presented loading difficulties;
- 3) light bulky waste, (i.e. cardboard boxes) created inefficient or light loads;
- 4) seasonal variation in waste volume, which caused scheduling difficulties;
- 5) competition for dumping space between municipal services and public users;
- 6) abuse and vandalism;
- 7) fires;
- 8) litter;
- 9) manual loading and sorting of wastes in the containers so that loads could be covered for transport;
- 10) rental equipment was often required for clean-up of the transfer stations;
- 11) inefficient loading - partially full containers were being picked up;
- 12) increasing costs to operate the system;
- 13) increasing public concern about the operation.

These and other problems continued until 1985 when the Authority realized something had to be done. The Authority members initiated a review of the system.

Throughout this review, control of operating costs was given the highest priority. To do this it was realized that two things had to be accomplished:

- 1) reduce transportation costs;
- 2) minimize cost of maintenance and clean-up.

To reduce the transportation costs, the Authority had to increase the amount of wastes in each container being lifted so that fewer trips would be necessary.

To evaluate the existing loading efficiency of the transfer stations, the Authority had to determine container load weights in their system and also determine if these load weights could be increased. Because the Authority had kept very good weight records, this task was relatively simple.

Figure 3 and Figure 4 were developed from the Flagstaff waste disposal records for 1984. The average loading for each transfer station and the average monthly loading for the whole system was determined. The annual average was calculated to be 3.7 tonnes per container.

In discussions with the operators, it was found that only partially full containers were being picked up during the winter when waste volumes were low. Also, the truck drivers would often travel to one transfer station and find empty containers. They would then travel to a second, and sometimes a third station before lifting a bin. They were literally looking for garbage and were adding on extra mileage in the process.

Flagstaff then looked to other regional waste management authorities for comparison. They contacted the Foothills Regional Waste Management Authority which operates a similar drop box system. From the data received from the Foothills Authority, an average loading at the Priddis station of 5 tonnes/load was calculated; the DeWinton station was averaging 7.7 tonnes/load. Obviously there was a reason for this difference of 3.7 tonnes at Flagstaff to 5.0 tonnes or 7.7 tonnes at Foothills transfer stations.

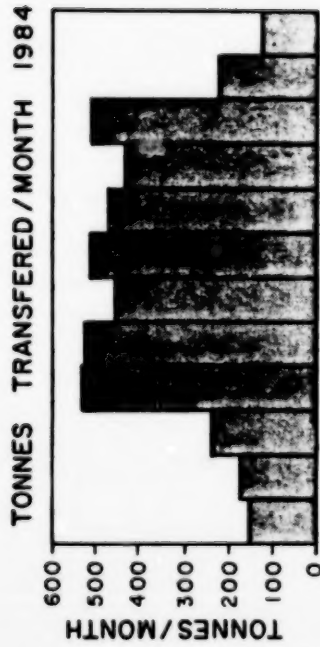
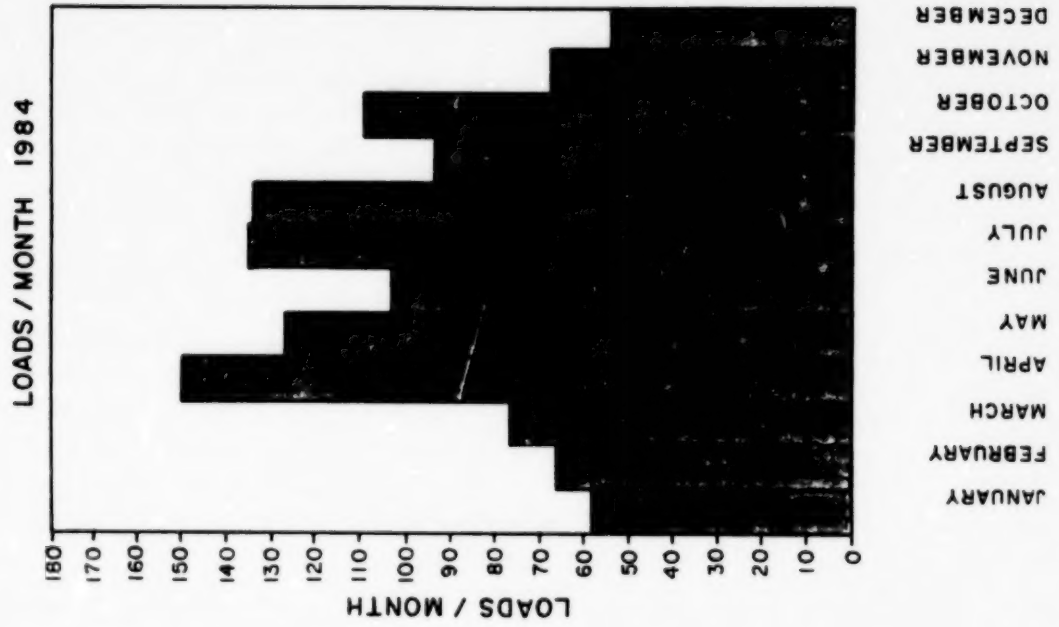
The Foothills transfer stations are supervised. Large volume waste such as appliances, trees and demolition wastes are directed to the Foothills Regional Sanitary Landfill. The extreme high average at the DeWinton station occurs because the operator does what one might call a "grass roots" recycling whereby he removes beverage containers, paper, and cardboard which he sells in the City of Calgary. He also packs the wastes in the container in the process.

Other systems in the province were also visited to look at their supervision and management methods. The Drumheller system introduced a key lock system at a few of their low volume transfer stations. Keys to the sites are kept at village offices where the residents pick them up to get entry to the site.

Camrose transfer stations have on-site supervision but, to minimize costs, only kept their transfer stations open one day out of the week.

The Flagstaff Authority realized then that they had to supervise the transfer stations and separate the wastes. This supervision would ensure that full containers would be hauled as the site supervisors could notify the truck operators; supervision would also reduce vandalism, fires and damages, and thus help control the costs of maintenance and clean-up.

The Flagstaff Authority preferred the one day a week operation with on site supervision and chose to proceed that way.



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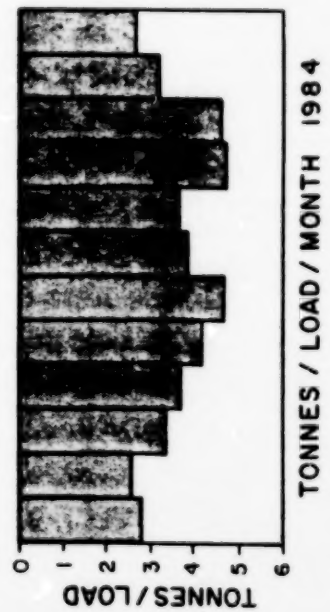


FIGURE 3. TRANSFER STATION WEIGHT RECORDS 1984
MONTHLY LOADING

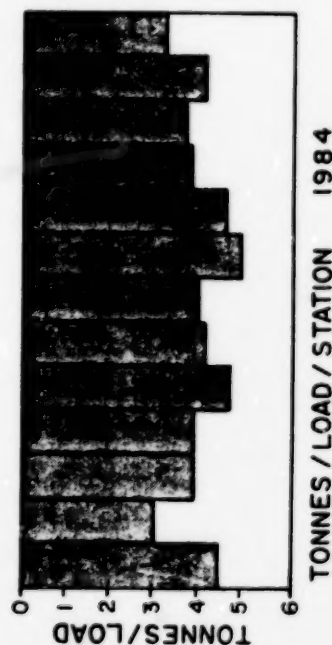
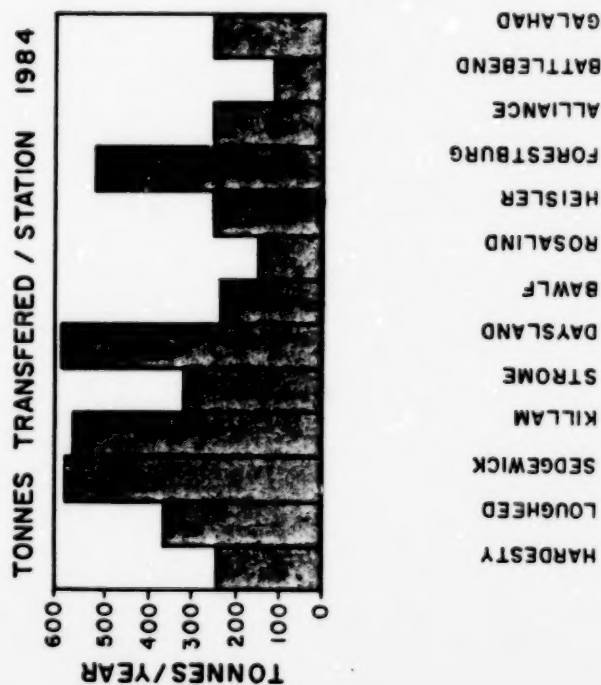
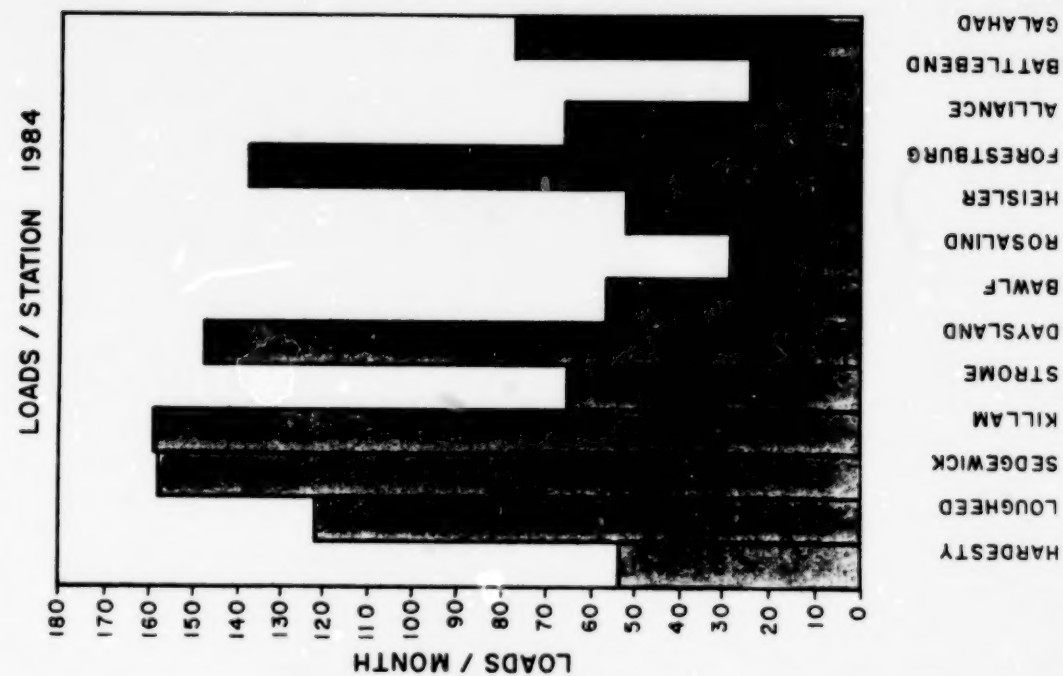


FIGURE 4. TRANSFER STATION WEIGHT RECORDS 1984
STATION LOADING

Because of the distances to the sanitary landfill, the Authority felt it was not fair to ask their residents to haul their bulky and demolition wastes to the landfill. They decided to take advantage of the "burning clause" in the Public Health Act, Waste Management Regulations. Burning could be done under supervision and only what is termed "clean burnable debris" could be burned. The Authority applied for burning permits and worked towards developing burning pits on the transfer station properties.

This system of supervision and waste separation was implemented on April 1, 1986. Immediately the Authority realized an improvement in efficiency. The average container loading increased by almost 1 tonne to 4.5 tonnes/load and there was a reduction in the number of loads to haul. There was less vandalism, virtually no fires in the containers, and overloading was controlled.

The one-day-a-week operation did fuel public protest because of the major cut back in service. The Authority adjusted hours and tried to accommodate the users as much as possible, yet still stayed with the controlled system. Eventually, as the public became more aware of the new operation and its benefits, the complaints diminished.

The Flagstaff Authority did not stop there. It was evident that with waste separation, the type of wastes being put in the 30 cubic meter containers could be put in smaller containers. The Authority also realized that more waste could be hauled if it was compacted. The Authority switched to 4.5 m³ bins and purchased a 28 m³ front-end loader compactor truck. This increased the average tonnage per load to over 6.5 tonnes and made it possible to pick up a number of transfer stations in one trip.

The Flagstaff system continues to evolve. Future plans for the system include selling the rear loader and purchasing a "BURRO" which is manufactured in Alberta. The BURRO uses standard front end loader containers for residential collection. This vehicle would be used in conjunction with the transfer stations and the front end loader truck. To do this, however, requires capital funds to purchase the BURRO and the 100 plus containers for commercial bins.

WHAT WAS LEARNED

As a result of the Flagstaff experience, and the experiences of the other 15 regional transfer systems in Alberta, it has been shown that three operating parameters must be considered in selecting a transfer system.

- 1) supervision or no supervision
- 2) separation or no separation of wastes
- 3) collection vehicles to deposit in the transfer station or to direct haul to the landfill

Table 1 shows the effect of these parameters on each of the two types of transfer stations. The decision flow chart (Figure 5) shows the selection process.

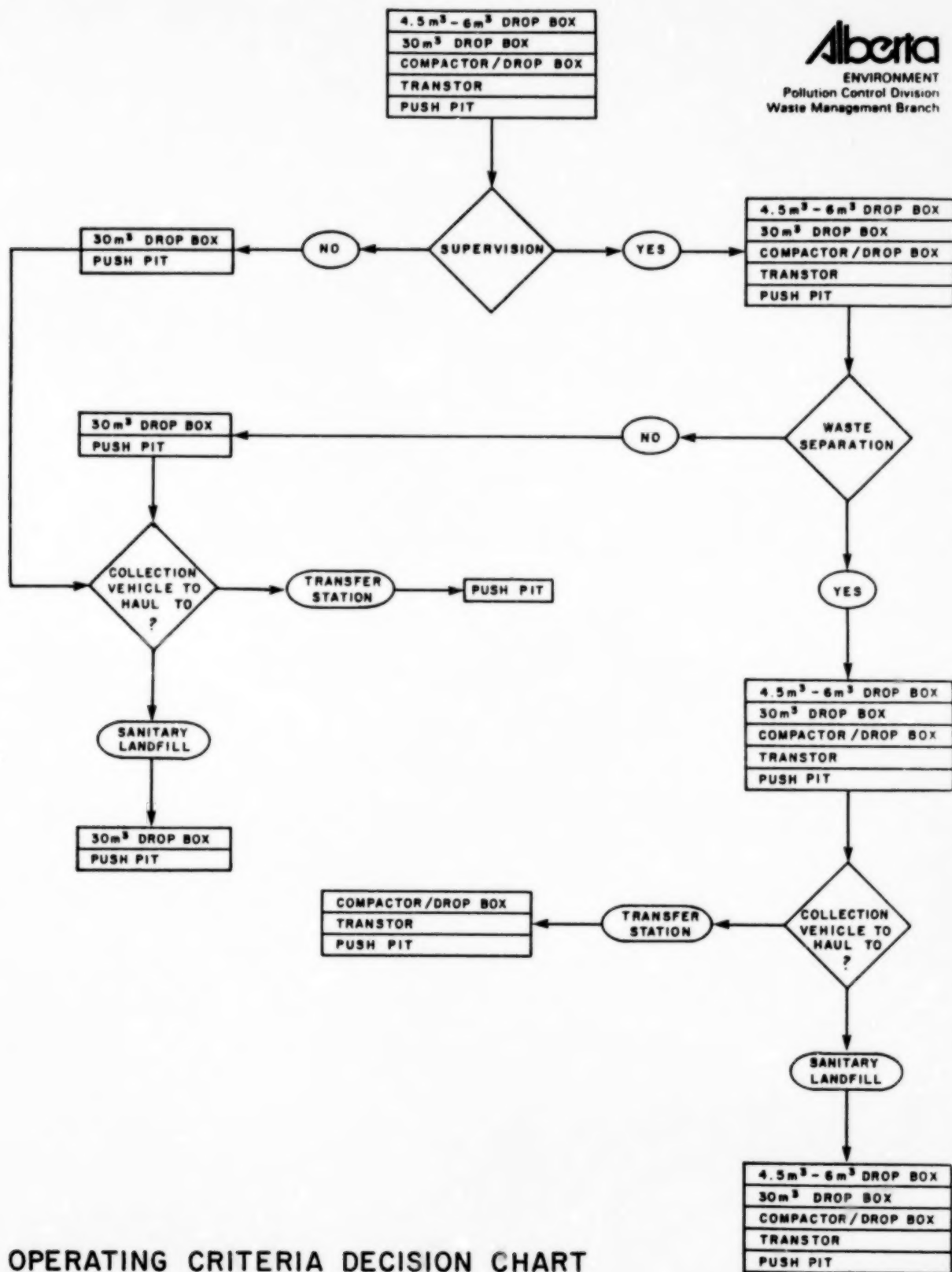
In addition to this, design of the transfer station system should be based on the following criteria:

- 1) storage capacity;
- 2) transport vehicle capacity;
- 3) routing;
- 4) requirements for handling specified wastes;
- 5) compatibility to collection vehicles.

TABLE 1 - OPERATING PARAMETERS DECISION TABLE

	Site Supervision	Waste Separation	Community Collection Direct Haul To Landfill	No Site Supervision	No Waste Separation	Community Collection to Transfer Stn.
4.5m ³ /6m ³ Front end compaction	X	X	X			
Stationary compaction Tilt-Frame truck	X	X	X			X
Open Top Drop Box 30m ³ Tilt Frame Truck	X	X	X	X	X	
Transtor	X	X	X			X
Push pit	X	X	X	X	X	X

* The X indicates which transfer station will work with the parameters set.
If there is no X, the likelihood of a successful operation is very minimal.



OPERATING CRITERIA DECISION CHART

FIGURE 5

Table 2 shows the effect of these criteria on each of the five types of transfer systems.

And last, the solutions to existing difficulties can be solved by implementing the following practices.

- 1) public information program
- 2) supervision
- 3) alternating days of access (public/municipal)
- 4) limited hours of operation
- 5) maintenance program
- 6) waste separation
- 7) recycling programs

Solutions are shown in relation to the problems on Table 3.

Because of a developing understanding of rural solid waste transfer, we have been able to implement changes in our methods of selection and operation of new transfer systems in Alberta. This experience and knowledge can be credited to the Regional Waste Management Authorities, who work with transfer day in and day out.

Type of Transfer system	Storage Capacity m ³	Transport Vehicle Capacity (tonnes)	Routing	Handling of Special Wastes	Compatibility to collection vehicles
Front-end loader Drop Box	4.5m ³ /6m ³ / 8m ³ multiple containers	4.5 to 7.5 tonnes	- pick up several containers - 1 trip - pick up several transfer stations - 1 trip	- will not accept bulky wastes (i.e. appliances, demol- ition wastes	- not suitable to accept waste from any standard collection vehicle
Tilt-Frame Drop Box	20m ³ /30m ³ / 38m ³ multiple containers	2.5 to 4.5 tonnes	- 1 container per trip - 1 transfer station per trip	- difficulties with wastes of excessive length and weight	- may be suitable for small collection vehicles
Inverting Bin (Transtor) Open Top Trailer	30 m ³ multiple containers	7.5 to 15 tonnes	- pick up 3 to 4 containers per trip - pick up several transfer stations per trip	- not suitable for demolition wastes - will not accept wastes of excess- ive weight or length	- compatible to most collection vehicles except luggers and tilt- frames
Compactor Drop Box Tilt-Frame truck	15m ³ /20m ³ / 30m ³ multiple containers with compactors	8 to 10 tonnes	- 1 container per trip - 1 transfer station per trip	- will not accept demolition wastes - some difficult- ies with sheets of plastic and metal, etc.	- depends upon hopper design - compatible to most collection vehicles except luggers and tilt- frames
Push Pit Open Top Trailer	55 m ³ and up	7.5 to 15 tonnes	- pick up one or several transfer stations per trip	- will accept most wastes yet precaution required on weight and long articles	- compatible with most collection vehicles

TABLE 2 DESIGN CRITERIA

TABLE 3
PROBLEM SOLVER GUIDE

PROBLEM	SOLUTIONS										
	Public Information Program	Increase Frequency of Pickup	Temporary Supervision	Key-Lock System	Full Time Supervision	Alternate Days of Access	Limit Hours of Operation	Maintenance Program	Increase Station Storage Capacity	Recycling Programs	Separation of Wastes
Overfilled		X		X	X	X	X		X		
Heavy, Bulky Wastes	X		X	X	X					X	X
Light weight bulky weights	X									X	
Variations in Waste Volumes		X			X	X	X				
Competitions Between Site Users		X				X	X		X		
Damages and Vandalism	X		X	X	X		X	X			
Fires	X		X	X	X						
Litter	X		X	X	X			X			
Manual loading & Sorting											
Rental Equipment for Clean-up		X	X	X	X						X
Inefficient Loading			X	X	X	X	X			X	X
Increasing Costs							X	X		X	X
Public Concern	X							X		X	